

form the mask oxide film described. Thus, the Nakanishi patent teaches away from the invention claimed because it includes a passivation step contra to using hydrogen or a hydrogen isotope.

The problems with the Lisenker et al. patent have been described in previous responses. In particular, the Lisenker et al. reference specifically excluded any device with an erase function. Thus, Lisenker also teaches away from the invention because Lisenker et al. describes the following:

The Lisenker et al. patent application states in the Summary, page 4, lines 36-37 and page 5, lines 1-5, that ‘the bond energy of the Si-H and Si-OH bonds is increased by replacing the hydrogen atoms with deuterium atoms. The Si-D and Si-OD bonds thus formed provide completed silicon dangling bonds that are less likely to break when exposed to electrical stresses. Therefore, the deuterium containing devices of the present invention have improved stability, quality, and reliability.’ Page 9, lines 11-15 state, ‘Because deuterated bonds are more stable than their hydrogen-containing counterparts, they ultimately supplant some hydrogenated bonds during long exposure to deuterium containing compounds.’ The feature of a deuterium bond of being less likely to break, described in the Lisenker et al. reference casts doubt on the ability of a deuterium-treated device to “erase” as is required in FLASH memory. Perhaps that is why the Applicant states on page 11, lines 5-8, ‘Especially preferred devices of this invention are MOS transistors in which the gate oxide-silicon layer contains additional deuterium containing bonds. However, other devices such as bipolar junction transistors are also within the purview of this invention.’

Lisenker et al. does not suggest that passivation with deuterium would be an effective way to reduce random single bit data loss in a FLASH memory circuit having a programming operation and an erase operation, as is claimed. To the contrary, Lisenker teaches away from this type of treatment for the reasons discussed above.

Nakanishi does not describe a use of hydrogen at all and certainly does not describe a use of hydrogen isotope to reduce random single bit data loss in a FLASH memory circuit. Lisenker et al. and Nakanishi both teach away from the invention claimed. The combination of the references cannot then, render the present invention obvious.

Claim 6 was rejected under 35 USC § 103(a) as being unpatentable over Nakanishi (U.S. 5,145,797) in view of Lisenker et al. (WO 94/19829) and further in view of admitted prior art as applied to claims 1-2, 4-5, & 7-10 above, and further in view of Nakajima et al. (U.S. 5,397,724). As discussed above, each of Nakanishi and Lisenker et al. teach away from the present invention. The Nakajima reference does not include motivation to combine with Lisenker because the

problem and solution described in Nakajima are not addressed in Lisenker. Further, there is no evidence in Nakajima that ammonia is used as part of the process, much less that a semiconductor is exposed, sequentially, “to atmospheres comprising Hydrogen isotope and ammonia enriched in Hydrogen isotope at an elevated temperature.”

Claims 11-14 rejected under 35 USC § 103(a) as being unpatentable over Nakanishi (U.S. 5,145,797) in view of Lisenker et al. (WO 94/19829) and further in view of admitted prior art as applied to claims 1-2, 4-5, & 7-10 above, and further in view of Sheu (U.S. 4,840,917). As discussed above, the Nakanishi patent and Lisenker et al. reference teach away from the invention claimed and do not suggest combination with each other. The Sheu patent is not directed to the method claimed either. There is no discussion or suggestion of applicability to a method for reducing random single bit data loss in a FLASH memory circuit having a programming operation and an erase operation.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. Applicant will be contacting the Examiner in order to schedule a time to discuss this application this month. The Examiner is invited to telephone Applicant's attorney at (612) 373-6976 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 15 day of December, 2003.

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ZUL